NALLAMUTHU GOUNDER MAHALINGAM COLLEGE (AUTONOMOUS)
POLLACHI – 642 001.

M.Sc. BOTANY

SYLLABUS
&
SCHEME OF EXAMINATION

CHOICE BASED CREDITS SYSTEM (CBCS)

[FOR THE STUDENTS ADMITTED DURING THE ACADEMIC YEAR 2016-2017 BATCH & ONWARDS]

(PASSED ON THE BOARD OF STUDIES HELD ON MARCH 2016)

NGM COLLEGE (AUTONOMOUS), POLLACHI – 01.
M.Sc. BOTANY SYLLABUS
[CHOICE BASED CREDITS SYSTEM] [FOR 2016-2017BATCH & ONWARDS]
SCHEME OF EXAMINATION

Sem	Code	Subject title	Class hours /Week	Exam Hrs	Maximum marks			Creditss
					Internal	External	Total	
I	16PBY101	Phycology, Mycology, Pathology, Lichenology and Bryology	5	3	25	75	100	4
I	16PBY102	Pteridophytes, Gymnosperms and Palaeobotany	5	3	25	75	100	4
I	16PBY103	Microbes & Microbial technology	5	3	25	75	100	4
I	16PBY1E1	**Elective -1** Algal Biotechnology	5	3	25	75	100	5
I	16PBY104	**Core Practical-I** (for core papers & elective -1)	5	4	40	60	100	4
II	16PBY205	Cytology, Anatomy and Embryology	5	3	25	75	100	4
II	16PBY206	Plant physiology	5	3	25	75	100	4
II	16PBY207	Genetics and Plant Breeding	5	3	25	75	100	4
II	16PBY208	**Core Practical- II** (for core papers)	5	4	40	60	100	4
II	16PBY2N1	**Non- Major Elective -1A** Mushroom cultivation	1	3		100	100	2
	16PBY2N2	**Non- Major Elective -1B** Bioinformatics						
III	16PBY309	Plant Systematics	5	3	25	75	100	5
III	16PBY310	Biochemistry	5	3	25	75	100	4
III	16PBY311	Research Methodology	5	3	25	75	100	4
III	16PBY3E2	**Elective -2** Genomics and Proteomics	5	3	25	75	100	5
III	16PBY312	**Core Practical- III** (Plant Systematics & elective -2)	5	4	40	60	100	4
III	16PBY313	**Core Practical –IV (**Biochemistry & Research Methodology)	5	4	40	60	100	4
IV	16PBY414	Plant Biotechnology	5	3	25	75	100	4
IV	16PBY415	Environmental management and Conservation of biodiversity	5	3	25	75	100	4
IV	16PBY4E3	**Elective -3** Forest Botany	5	3	25	75	100	5
IV	16PBY416	**Core Practical -V** (for core papers & elective -3)	5	4	40	60	100	4
IV	16PBY4P1	Project Work and Viva-Voce	6	-	40	160	200	8
		Total					2200	90

SCHEME OF VALUATION

Papers	Credits	Internal	External	Total
Core	4	25	75	100
Core practical	4	40	60	100
Elective	5	25	75	100
Non- major elective	2	25	75	100
Project work	8	0	100	200
viva-voce		50	50	

General question paper pattern

Max. Marks:100	Internal : 25	External : 75	
Section	**Pattern**	**Mark**	**Total**
Part A	One word question/multiple choice/ true/false (10 Questions)	10X1	10
Part B	Either (or) choice (5 Questions)	5X5	25
Part C	Either (or) choice (5 Questions)	5X8	40
		Total :	75

Department	Botany	
Course	M.Sc., Botany	Effective from the Year: 2016
Subject Code : 16PBY101 Title : PHYCOLOGY, MYCOLOGY, PATHOLOGY, LICHENOLOGY AND BRYOLOGY		Semester: 1
Hrs/Week :	5	Credits: 4
Objectives	• To define and characterize the floral diversity • To understand the range of diversification of species • To realize the fundamental values of diversity • To evolve strategies for diversity conservation and sustainable use.	

Unit	Content	Hrs
Unit I	**PHYCOLOGY**: General characteristics – distribution - classification of algae (Fritsch, 1945) - comparative studies of structure, distribution, reproduction, life cycles, phylogeny and interrelationships of cyanophyta, chlorophyta, phaeophyta and rhodophyta - economic importance of algae.	13
Unit II	**MYCOLOGY:** General characteristics of fungi - classification of fungi (Alexopoulos and Mims, 1979) - structure, distribution, nutrition, reproduction, phylogeny and interrelationship of myxomycetes, oomycetes, ascomycetes, basidiomycetes and deuteromycetes - host-parasite interaction - heterothallism and economic importance of fungi – contributions of eminent Indian mycologists.	13
Unit III	**PATHOLOGY:** Fungi and plant diseases – pathogenesis – defense mechanism in plants – phytotoxins and phytalexins – causal organism, symptoms, disease cycle and control measures of the following diseases – downy mildew of grapes, panama disease of banana, leaf rust of coffee and sheath blight of rice – fungi as biocontrol agents.	13
Unit IV	**LICHENOLOGY:** General characteristics of lichens - classification of lichens (Hale, 1969) - occurrence and interrelationship of phycobionts and mycobionts, structure and reproduction in ascolichens, basiodiolichens and deuterolichens - lichens as indicators of pollution - economic importance of lichens.	13
Unit V	**BRYOLOGY:** General characteristics of bryophytes - classification of bryophytes (Riemers, 1954) – distribution, structure, reproduction of gametophyte and sporophytes in major classes of bryophytes – spore dispersal mechanism and economic importance - bryophytes as pollution indicators.	13

TEXT BOOKS

1. Gangulee and Kar, 1970. College Botany Vol. II. New Central Book Agency, New Delhi.
2. Rangaswamy, G. and Mahadevan, A. (1999). Diseases of crop plant in India 4th Edition.
3. Smith, G.M. 1938. Cryptogamic Botany. Vol, I. Mc Graw Hill Book Co., New York.
4. Vashishta, B.R., Sinha, A.K. and Kumar, A. 2005. Botany for degree Students, Bryophyta. S. Chand and Co. Ltd, New Delhi.

REFERENCE BOOKS

1. Alexopoulos, C.J. and Mims, C.W. 1979. Introductory Mycology. Wiley Eastern Ltd, New Delhi.
2. Fritsch, F.F. 1972. The Structure and Reproduction of the Algae Vol. II. Cambridge University Press, UK.
3. Kumar, H.D. 1988. Introductory Phycology. Affiliated East-West Press Ltd. New Delhi.
4. Morris, I. 1986. An introduction to the Algae. Cambridge University Press, UK.
5. Sharma, P.D. 2006. Plant Pathology. Narso Publishing House, New Delhi.
6. Singh, S.K. 2006. Text Book of Bryophyta, Campus Books, New Delhi.
7. Webster, J. 1970. Introduction to Fungi. Cambridge University Press, UK.

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Department	Botany	
Course	M.Sc., Botany	Effective from the Year: 2016
Subject Code : 16PBY102 Title : PTERIDOPHYTES, GYMNOSPERMS AND PALEOBOTANY		Semester: 1
Hrs/Week :	5	Credits: 4
Objectives	• To define and characterize diversity of lower vascular plants • To understand thedynamics of diversity • To realize the significance of diversity.	

Unit	Content	Hrs
Unit I	**PTERIDOPHYTES:** General characteristics of pteridophytes - classification of pteridophytes (Sporne, 1975) – comparative morphology, anatomy, reproduction and life cycle of psilophytopsida, psilotopsida, lycopsida, sphenopsida and pteropsida	13
Unit II	Origin of pteridophytes - phylogenetic trends – stelar evolution - sorus evolution - heterospory and seed habit - apogamy and apospory - affinities of various classes of pteridophytes - economic importance of pteridophytes.	13
Unit III	**GYMNOSPERMS:** General characteristics and classification of gymnosperms (Sporne, 1965) – comparative morphology, anatomy, reproduction and lifecycle of cycadales, coniferales, ginkgoales and gnetales.	13
Unit IV	Affinities of gymnosperms with angiosperms and pteridophytes - phylogenetic considerations of various classes of gymnosperms - economic importance of gymnosperms.	13
Unit V	**PALAEOBOTANY:** Introduction to palaebotany - geological time scale - radiocarbon dating- fossil pteridophytes- fossil gymnosperms - fossil fuels - fossil pollen analysis – fossil sites – institute for palaeobotanical studies.	13

TEXT BOOKS

1. Gangulee and Kar, 1970. College Botany Vol. II. New Central Book Agency, New Delhi.
2. Vashishta, P.C. 1991. Gymnosperms. S. Chand & Company Ltd., Ram Nagar, New Delhi.
3. Vashishta, P.C. 1991. Vascular Cryptogams. S. Chand & Company Ltd., Ram Nagar, New Delhi.

REFERENCE BOOKS

1. Arnold, C.A. 1947. An Introduction to Paleobotany. Academic Press, New York and London
2. Biswas, C. and Johrc, B.M. 1977. The Gymnosperms. Narosa publishing House, New Delhi.
3. Bower, F.O. 1923-28. The ferns. Vol 1-3; Cambridge University Press, London.
4. Eames, A.J. 1936. Morphology of Vascular Plants. Lower groups, New York and London.
5. Meyen, S.V. 1987. Fundamentals of Paleobotany. Chapman and Hall, New York.
6. Sporne, K.R. 1965. The Morphology of Pteridophytes. Hutchinson & Co., London
7. Sporne, K.R. 1967. The Morphology of Gymnosperms. Hutchinson & Co., London.

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Department	Botany	
Course	M.Sc., Botany	Effective from the Year: 2016
Subject Code : 16PBY103 Title : MICROBES AND MICROBIAL TECHNOLOGY		Semester: 1
Hrs/Week :	5	Credits: 4
Objectives	• To introduce the techniques involved in microbiology • To study their industrial application • To know the role of microbes in human welfare	

Unit	Content	Hrs
Unit I	Microbiology – history, branches and scope - classification of microorganism (Bergey's, 1974) – modern trends in bacterial taxonomy - prokaryotic and eukaryotic microbes – ultra structure of Bacterium - microscopy - light, electron and laser optic system - micrometry.	13
Unit II	Culture media – characteristics, types and preparation – microbial cultures – methods of culturing aerobes and anaerobes – methods of isolation and maintenance of pure culture – microbial growth - nutritional types of microorganisms – enumeration and preservation of microbes - staining techniques.	13
Unit III	Bacteria – general characters – bacterial pathogens - *Staphylococcus, Streptococcus, Escherichia, Salmonella & Mycobacterium* - Viruses – general characters – viral identification – viral transmission and effect of viruses on plants – cucumber mosaic virus, tomato spotted wilt virus, cauliflower mosaic virus. Control of microorganisms - physical and chemical methods - antibiotics and chemotherapeutic agents - anti microbial susceptibility test.	13
Unit IV	Industrial microbiology – fermenters and fermentative microbes – culture preservation – production of microbial products – strain improvement techniques – production of alcohols, malt beverages, organic acids, antibiotics and aminoacids - immobilization of microbes and enzymes - microbial leaching – biodegradation – biosensors.	13
Unit V	Microbial diversity - methods to assess microbial diversity - merits and demerits of culture dependent and culture independent methods - molecular analysis of bacterial community - Denaturing Gradient Gel Electrophoresis (DGGE), Terminal Restriction Fragment Length Polymorphism (T-RFLP), Amplified Ribosomal DNA and Restriction Analysis (ARDRA).	13

TEXT BOOKS

1. Dubey R.C. and D.K. Maheshwari, 1999. Text book of microbiology, S. Chand & Co. Pvt. Ltd., New Delhi.
2. Pelzer Jr. M.J., E.C.S. Chan and N.R. Kreig, 1993. Microbiology, Mc Graw Hill Inc., New York.
3. Prescott, L.M., J.P. Harley and D.A. Klein, 2007. Microbiology, McGraw Hill, Boston.

REFERENCE BOOKS

1. Greenwood, D., R. Slack and J. Peutherer, 1997. Medical Microbiology, ELST with Churchill Livingstone, Hong Kong.
2. Prescott, L.M., J.P. Harley and D.A. Klein, Microbiology, 6/e, 2005. Mc Graw Hill, Boston.
3. Salle, A.J., 1999. Fundamental Principles of Bacteriology, Tata McGraw - Hill Publishing Company Limited, New Delhi.

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Department	Botany	
Course	M.Sc., Botany	Effective from the Year: 2016
Subject Code : 16PBY1E1 Title : ALGAL BIOTECHNOLOGY		Semester:1
Hrs/Week :	5	Credits: 5
Objectives	• To understand the techniques in the culture and processing of algae • To know the economic value and applied aspects of algal biotechnology.	

Unit	Content	Hrs
Unit I	Introduction to algae and their importance - algae as a source of food and fodder - algal polysaccharides (agar agar, carageenan and alginic acid) - algae in pharmaceutical industries - algal biofertilizer and biofuel - algae as indicator of pollution.	13
Unit II	Introduction to microalgal biotechnology - bioprospecting microalgae for commercial applications - basic microalgal culturing techniques - bioactive and novel chemicals from microalgae - commercial species of industrial production (*Chlorella* and *Dunaliella*) - mass cultivation and processing - microalgae for aquaculture - water pollution and bioremediation by microalgae.	13
Unit III	Introduction to blue green algal (BGA) biotechnology – cyanobacteria - diversity, organization and features – harmful algal blooms (*Anabaena* and *Microcystis*) - *Spirulina* – nutritive and therapeutic values – value added biochemicals – *Spirulina* – culture and mass cultivation – photobioreactors.	13
Unit IV	Introduction to macroalgal biotechnology - biochemical composition of seaweeds – bioactive metabolites of seaweeds - extraction and characterization of bioactive components from seaweeds - commercial uses of seaweeds - seaweed cultivation methods (rope and spore methods) – propagation by protoplast fusion and tissue culture techniques.	13
Unit V	Algal transgenics - production of transgenic algae (selectable marker genes, promoters, reporter genes, and transformation techniques in algal biotechnology) - genetically modified algae and bioprospecting – molecular farming using transgenic algae.	13

TEXT BOOKS

1. Bold, H.C. and Wynne, M.J. 1976. Introduction to Algae structure and reproduction. Prentice-hall.
2. Smith and Wittick. 1987. An introduction of Algae. Blackwell Publication.
3. Tridevi, P. C. 2001. Algal Biotechnology. Point Publisher, Jaipur, India.

REFERENCE BOOKS

1. Becker, S. W. 1994. Micro Algae Biotechnology and Microbiology. Cambridge University Press.
2. Chapman, F.G. and Chapman, D.J. 1973. The Algae. McMillan & Co.
3. Fritsch, F.E. 1935 and 1945. Structure and reproduction in Algae Vol. I& II, Cambridge University press. 9. Marris, I. 1967. An introduction to the Algae Hatchinson University Lab.
4. McCandless, E.L. 1981. Polysaccharides of seaweeds. In The Biology of seaweeds, ed. C.S. Lobban and M.J. Wynne, pp. 559-88. Blackwell, Oxford.
5. Presott, G.W. 1970. How to know freshwater Algae W.C. Braun & Co.
6. Round, F.E. 1966. The Biology of Algae Edward Arnold.
7. Venkatraman, G. S. 1972. Algal Biofertilizers and rice cultivation. Today and Tomorrows Printers and Publishers, New Delhi.
8. Zajic, J. E. 1970. Properties and Products of Algae. Plenum Press, New York.

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Department	Botany	
Course	M.Sc., Botany	Effective from the Year: 2016
Subject Code : 16PBY104 Title : CORE PRACTICAL I		Semester: 1
Hrs/Week :	5	Credits: 4
Objectives	• To acquire practical knowledge on thallus organization of lower plants • To get hands on knowledge on microbes and algal culture techniques.	

Unit	Content	Hrs
Unit I	**PHYCOLOGY, MYCOLOGY PATHOLOGY, LICHENOLOGY AND BRYOLOGY** Vegetative and reproductive structures of Algae: *Cosmarium*, *Volvox*, *Caulerpa,* Diatoms*, Dictyota* and *Gracilaria* Fungi: *Rhizopus, Ascobolus*, *Pleurotus* and *Cercospora* Pathology: Downy mildew of grapes, panama disease of banana, leaf rust of coffee, sheath blight of rice. Bryophytes: *Marchantia, Anthoceros* and *Polytrichum.* Lichenology**:** *Usnea*	**13**
Unit II	**PTERIDOPHYES, GYMNOSPERMS AND PALAEOBOTANY** Vegetative and reproductive structures of Pteridophytes-*Selaginella*, *Equisetum*, *Ophioglossum*, *Adiantum* and *Marselia*. Gymnosperms -*Pinus*, *Araucaria* and *Gingko.* Paleobotany - *Rhynia, Lepidodendron, Lepidocarpon, Williamsonia, Lagenostoma, Lyngiopteris*.	**13**
Unit III	**MICROBES AND MICROBIAL TECHNOLOGY** • Preparation of non-selective and selective media • Culture methods (pour plate, slant & broth) • Enumeration of bacteria (plate count) from soil and water • Observation of motility of bacteria (hanging drop technique) • Staining methods: simple, negative and Gram staining • Biochemical tests for bacteria • Bacterial growth curve • Test for coliform bacteria • Spoilage of milk by microorganisms (methylene blue test) • Antibiotic assay	**13**
Unit IV	**ALGAL BIOTECHNOLOGY** • Introduction to microalgae • Collection of microalgae	

	• Phytoplankton net • Culturing of microalgae (*Chlorella or Spirulina*) • Enumeration of microalgae • Diversity indices of microalgae • Freshwater quality assessment using Palmer & Nygaard's index	**13**
Unit V	• Estimation of chlorophyll in algae • Estimation of dissolved oxygen • Estimation of primary productivity • Introduction to macroalgae • Culturing of macro algae / seaweed (demo only) • Commercial products from macroalgae	**13**

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Department	Botany	
Course	M.Sc., Botany	Effective from the Year: 2016
Subject Code : 16PBY205 Title : CYTOLOGY, ANATOMY AND EMBRYOLOGY		Semester: 2
Hrs/Week :	5	Credits: 4
Objectives	• To understand the structure of cells in relation to the functional aspects • To study the internal structure of various tissue systems and organs. • To know the mechanisms processes in the reproductive phase of plants	

Unit	Content	Hrs
Unit I	**CYTOLOGY:** Structural organization of the plant cell - cell wall - primary and secondary - plasma membrane - structure, models and functions, channels, pumps and receptors - plasmodesmata - ultra structure of chloroplast and mitochondria - chloroplast and mitochondrial genomes - structure and functions of glyosomes, peroxisomes, spherosomes and lysosomes - ultra structure of nucleus - Structure and organisation of chromosomes.	13
Unit II	**ANATOMY:** General account and theories of organization of shoot apex and root apex - quiescent centre and modern concept on meristems - structural diversity, functional complexity and phylogenetic trends in specialization of complex permanent tissues (xylem and phloem) - cambium - origin - structure, storied and non-storied types - formation of cork cambium, and periderm - anomalous secondary growth in dicot and monocot.	13
Unit III	**ANATOMY:** Vascular differentiation in primary and secondary structure of root and stem in dicot and monocot - origin of lateral roots - root stem transition - anatomy of dicot and monocot leaves - stomatal types - nodal anatomy - petiole anatomy – trichomes – glands - secretory tissues – nectaries - laticifers and their significance.	13
Unit IV	**EMBRYOLOGY:** Microsporangium - microsporogenesis - microspores - arrangement - morphology - ultrastructure - microgametogenesis - pollen - stigma - incompatibility - methods to overcome incompatibility - megasporangium - megagametogenesis - female gametophyte - monosporic - bisporic and tetrasporic - nutrition of embryo sac and fertilization.	13
Unit V	**EMBRYOLOGY:** Endosperm - types - endosperm haustoria - cytology and physiology of endosperms - functions of endosperms - embryo development in dicot and monocot - nutrition of embryo – polyembryony- apomixis - apospory.	13

TEXT BOOKS

1. Bhojwani, S.S. and Bhatnagar, S.P. 1986. The Embryology and Angiosperms. Vikas publishing house pvt. Ltd, New Delhi.
2. Easu, K. 1985. Plant Anatomy, Wiley Eastern Pvt. Ltd., New Delhi.
3. Johri, B.M. (ed) 1983. Embryology of Angiosperms, Springer-Verlag, New York.
4. Pandey, B.P. 1993. Plant anatomy, S. Chand & Co, New Delhi.

REFERENCE BOOKS

1. Baker, J.R. 1966. Cytological Techniques (5^{th} ed.), Methuen, London.
2. Bierhorst, D.W. 1971. Morphology of vascular plants. Macmillan publishers, New York.
3. Maheshwari, P. 1963. Recent Advances in Embryology of Angiosperms. Intl. Soc. Plant Morphologists, New Delhi.
4. Pullaiah, T., Lakshiminarayana, K. and Hanumantha Rao, B. 2006. Text book of Embryology of Angiosperms. Regency Publications, New Delhi.
5. Raghuvanshi, R.K., Chauhan, A.K.S. and Siddiqui, B.A. 1995. Practical exercises in Cytology, genetics, Plant Breeding and Biostatistics. CBS Publishers & Distributors, New Delhi.
6. Swanson, P. and Webster, P. 1977. The Cell. Prentice Hall, Inc. Englewood Cliffs, New Jersey, USA.

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Department	Botany	
Course	M.Sc., Botany	Effective from the Year: 2016
Subject Code : 16PBY206 Title : PLANT PHYSIOLOGY		Semester: 2
Hrs/Week :	5	Credits: 4
Objectives	• To understand the concepts involved in the functions of plants • To study the recentaspects of various physiological processes in plants.	

Unit	Content	Hrs
Unit I	Water and plant cells - water balance of the plant - mineral nutrition - Uptake, transport and translocation of water, ions, solutes and macromolecules from soil, through cells, across membranes, through xylem and phloem – transpiration - mechanisms of loading and unloading of photoassimilates - Signal transduction: receptors and G-proteins, phospholipids signaling - role of cyclic nucleotides, calcium - calmodulin cascade - protein kinases and phosphatases - specific signaling mechanisms (two component sensor – regulator system).	13
Unit II	Photosynthesis: evolution of photosynthetic apparatus - photosynthetic pigments and light harvesting complexes - photooxidation of water - mechanism of electron and proton transport - carbon assimilation - calvin cycle - photoprotective mechanisms - CO_2 fixation - C_3, C_4 and CAM pathways - Respiration and photorespiration: citric acid cycle - plant mitochondrial electron transport and ATP synthesis - alternate oxidase - photorespiratory pathway - RUBISCO - significance of photorespiration.	13
Unit III	Nitrogen metabolism: Nitrate and ammonium assimilation - amino acid biosynthesis - Phytohormones: biosynthesis and mechanism of action of phytohormones - auxin, gibberellin, cytokinin, ethylene and ABA – apoptosis - Sensory photobiology: structure, function and mechanisms of action of phytochromes, cryptochromes and phototropins - stomatal movements - photoperiodism and biological clocks.	13
Unit IV	Carbohydrate metabolism – regulation of starch and sucrose biosynthesis, synthesis and degradation of cellulose - pectin biosynthesis and enzymes involved in pectin degradation - organic acid metabolism – metabolism and roles of oxalic acid, ascorbic acid and malic acid - Lipid metabolism: synthesis of membrane lipids, structural lipids and storage lipids and their catabolism - gluconeogenesis.	13

Unit V	Secondary metabolites - Shikimate pathway and its role in biosynthesis of secondary metabolites - biosynthesis of terpenes, phenols and nitrogenous compounds and their roles - Stress physiology: responses of plants to biotic (pathogen and insects) and abiotic (water, temperature and salt) stresses - mechanisms of resistance to biotic stress and tolerance to abiotic stress.	**13**

TEXT BOOKS

1. Jain, V.K. 2000. Fundamentals of Plant Physiology (5th ed.), S. Chand & Co Ltd; New Delhi.
2. Pandey, S.N. and Sinha, B.K. 2010. Plant Physiology, Vikas Publishing, New Delhi.

REFERENCE BOOKS

1. Devlin, R.M. and Baker, N.R. 1973. Photosynthesis, Reinhold Affiliated East-West Press Pvt. Ltd, New Delhi.
2. Moore, T.C. 1979. Biochemistry and physiology of plant hormones. Narosa book Distributors, New Delhi.
3. Roberts, E.A. 1987. Plant growth regulators. Kluwer Academic publishers, London.

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Department	Botany	
Course	M.Sc., Botany	Effective from the Year: 2016
Subject Code : 16PBY207 Title : GENETICS AND PLANT BREEDING		Semester: 2
Hrs/Week :	5	Credits: 4
Objectives	• To understand the heredity and the variation of inherited characteristics • To study the gene behavior its distribution and mutations • To acquire knowledge on various breeding methods • To learn the applications of induced mutations	

Unit	Content	Hrs
Unit I	Classical genetics: Mendelian genetics – interaction of genes, modified mendelian ratio - genetics of multiple alleles - penetrance and expressivity – pleiotropism, pseudoalleles, and phenocopies - quantitative inheritance - sex linked, sex influenced inheritance (special reference to plants) - genetics of sex determination - chromosome mapping – reverse genetics and epigenetics.	13
Unit II	Extra-nuclear inheritance: cytoplasmic inheritance – chloroplast – mitochondrial genome in higher plants - DNA as genetic material, transposable elements - population genetics - Hardy-Weinberg Law - gene pool, gene frequency and genotype frequency.	13
Unit III	Classification of mutations - gene mutations - spontaneous and induced mutations – physical and chemical mutagens - molecular basis of gene mutation - point and frame shift and suppressor mutation - gene regulatory mechanisms (prokaryotes & eukaryotes) – genetic disorders in human.	13
Unit IV	Modern Genetics: Gene mapping methods based on test-cross and F2 progenies - LOD score analysis - tetrad analysis and its significance - somatic cell genetics and its use in mapping - molecular markers for genome mapping - principles and methods of QTL mapping - RNA interference (RNAi) - PTGS, RNAi and related phenomena - genetic analysis using RNAi - high-throughput small RNA profiling - RNAi microarrays.	13
Unit V	Introduction to breeding of cultivated plants - significance of breeding - polyploidy and haploids in plant breeding – Breeding techniques: Selection techniques: Types of selection -selection in segregating populations – pedigree method, bulk method and back cross method.	13

	Hybridization: Intervarietal, interspecific and intergeneric hybridization - heterosis - hybrid vigour - marker assisted breeding - national and international organizations for crop improvement.	

TEXT BOOKS

1. Gardener, E.J. 1975. Principles of Genetics (5th ed.), John wiley, New York.
2. Gupta, P.K. 1994. Genetics, Rashtogi Publication, Meerut, India
3. Singh, E.D. 1990. Plant Breeding. Kalyani Publishers, New Delhi.

REFERENCE BOOKS

1. Allard, R.W. 1960. Principles of Plant Breeding, John Wiley and Sons, Inc. New York.
2. Gilber, N.W. 1978. Organellar heredity, Revan press, New York.
3. King, R.C. 1975. A Hand book of Genetics, Plenum Press, New York.
4. Simmonds, N.W. 1979. Principles of Crop improvement. Longman, London.
5. Strickberger, M.V. 1977. Genetics, Macmillan publishers, New York.

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Department	Botany	
Course	M.Sc., Botany	Effective from the Year: 2016
Subject Code : 16PBY208 Title : CORE PRACTICAL II		Semester: 2
Hrs/Week :	5	Credits: 4
Objectives	• To study the physiological processes in the plant system • To acquire practical knowledge on cell and tissue development and organization • To know the inheritance in plants and breeding techniques.	

Unit	Content	Hrs
Unit I	**CYTOLOGY** 1. Study of cells (Prokaryotic and Eukaryotic) 2. Chromosome morphology 3. Specialized chromosomes 4. Mitotic and meiotic divisions	13
Unit II	**ANATOMY** 1. Preparation of sections of stem, root and leaf 2. Staining of various plant tissues 3. Anomalous secondary thickening in monocot and dicots. 4. Microtomy 5. Maceration techniques 6. Slide submission (Microtomy – 5, free hand sections – 5)	13
Unit III	**EMBRYOLOGY** 1. Anther development 2. Female gametophyte 3. Endosperm-types and haustoria 4. Dissection of embryos 5. Polyembryony	13
Unit IV	**PLANT PHYSIOLOGY** 1. Rate of transpiration under varying climatic factors 2. Rate of photosynthesis under varying CO_2 concentration in water plants. 3. Rate of respiration using Ganongs respiroscope 4. Separation of plant pigments by thin layer, paper and column chromatography. 5. Estimation of chlorophyll and carotenoid pigments 6. Determination of total antioxidant activity by phosphomolybdenum reduction method.	13

Unit V	**GENETICS AND PLANT BREEDING** 1. Mendelian inheritance 2. Non – mendelian inheritance 3. Plant breeding techniques	**13**

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Dr. E. Neelamathi	Dr. E. Neelamathi		
Dr. P. Sathish Kumar			
Dr. C. Anbarasu			

Department	Botany	
Course	M.Sc., Botany	Effective from the Year: 2016
Subject Code : 16PBY2N1 Title : MUSHROOM CULTIVATION		Semester: 2
Hrs/Week :	1	Credits: 2
Objectives	• To impart skills on mushroom cultivation, an agro based industry • To have an idea on the intricacies of mushroom cultivation	

Unit	Content	Hrs
Unit I	Introduction – morphology –types of mushroom – identification of edible and poisonous mushroom – nutritive and medicinal values – life cycle of common edible mushrooms.	3
Unit II	Methods of mushroom cultivation (Hanging bag, bed and rack method) – prospects and scope of mushroom cultivation in small scale industry.	3
Unit III	Life cycle of *Pleurotus, Agaricus*, *Volvariella, Calocybe* and *Lentinus* – breeding and genetic improvement of mushroom strains.	2
Unit IV	Cultivation – conditions for tropical and temperate countries, isolation – spawn production – growth media – spawn running and harvesting of mushrooms.	2
Unit V	Diseases and post harvest technology – harvesting - freezing, dry freezing, drying, packaging and marketing - recipes from mushrooms.	2

TEXT BOOKS

1. Hand book of mushroom cultivation, 1999, TNAU publication.
2. Nita Bhal. (2000). Handbook on Mushrooms. 2nd ed. Vol. I and II. Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.
3. Tripathi, D. P. (2005). Mushroom Cultivation. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.

REFERENCE BOOKS

1. Alice, D., Muthusamy and Yesuraja, M. (1999). Mushroom Culture. Agricultural College, Research Institute Publications, Madurai.
2. Pathak, V. N. and Yadav, N. (1998). Mushroom Production and Processing Technology. Agrobios, Jodhpur.
3. Tewari Pankaj Kapoor, S. C. (1988). Mushroom Cultivation. Mittal Publication, New Delhi.

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Dr. P. Sathish Kumar	Dr. E. Neelamathi		

Department	Botany	
Course	M.Sc., Botany	Effective from the Year: 2016
Subject Code : 16PBY2N2 Title : BIOINFORMATICS		Semester: 2
Hrs/Week :	1	Credits: 2
Objectives	• To gain knowledge on Bioinformatics and databases • To understand the applications of bioinformatics tools	

Unit	Content	Hrs
Unit I	Fundamentals of computers: Introduction and scope of bioinformatics, Introduction to computers - types of hardware and software operating systems - internet - world wide web-search engines - their functions - searching - file formats, telnet, ftp.	3
Unit II	Biological Databases - sequence and structure- data retrieval - searching source data bases - sequence similarity searches - FASTA and BLAST, CLUSTAL and PHYLIP - use of nucleic acids and protein data banks - NCBI, EMBL, DDBJ, SWISSPROT – multiple sequence alignment.	3
Unit III	Data analysis: Sequence analysis, pair wise alignment and data base search - phylogenetic analysis, profiles and motifs - protein structure visualization - prediction of function from a sequence.	2
Unit IV	Chemical composition of biomolecules. - DNA and RNA - Structure of DNA - development of DNA sequence methods - gene finding and feature detection in DNA.	2
Unit V	Sequencing of databases: Pair wise sequence comparison, sequencing proteins, genome sequencing, SAGE, biological data bases - drug designing - Human genome project and gene therapy.	2

TEXT BOOKS

1. Andreas D. Baxevanis and B.F. Francis overlette, 2002. Bio-informatics, John wiley& Sons.
2. Attwood, T. K. and Parry Smith, D. J. 1999. Introduction to bioinformatics Addison Wesley congman Limited, England.
3. Chowdhary, K. R., and Bansal. V. S. 2011. Bioinformatics and computational technologies. 1 stedn. Scientific publishers, New Delhi.
4. Ignacimuthu, S.J. 2005. Basic Bio-informatics, V.K. Mehra, Narosa publishing house.

REFERENCE BOOKS

1. Des Higgins, Willie Taylor, 2004. Bio-informatics, Oxford university press.
2. Dunn, S. R. and Pennington, M. J. 2002. Proteomics from protein sequences to function 3rdedn. Viva books Pvt., Ltd, New Delhi.
3. Gibas and Jamback. Developing Bioinformatics Computer skills, O- Rielly Associates
4. Harshishtha,D.,.2006. Techniques in teaching computers. International book distributor , Dehradun.
5. Irfan alikhan, AtiyaKhanum, 2003. Essentials of Bio-informatics, Ukaaz publications.
6. Primrose, S. B., and Twyman, R. M., 2003. Principles of genome analysis and genomics.
7. Rastpgo, S, N. Mendinatta and P. Rastogi. 2003. Bio-informatics—Concepts, skills and application. CBS. publication, New Delhi

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Dr. E. Neelamathi	Dr. E. Neelamathi		

Department	Botany	
Course	M.Sc., Botany	Effective from the Year: 2016
Subject Code : 16PBY309 Title : PLANT SYSTEMATICS		Semester: 3
Hrs/Week :	5	Credits: 5
Objectives	• To learn nomenclature systems and to identify the plants • To introduce modern trends in taxonomy • To know the economic uses of plants	

Unit	Content	Hrs
Unit I	A brief historical account of the classification of angiosperms upto the present day. Systems of classification: Detailed study of Bentham & Hooker, Engler & Prantl, Bessy, Hutchinson, Takhtajan, Cronquist – Merits and demerits - International code of Botanical Nomenclature - Typification, Principles of priority and their limitations, Effective and valid publication, citation, retention, choice and rejection of names.	13
Unit II	Vegetative, floral characters and economic importance of the following families: Polypetalae: Portulacaceae, Menispermaceae, Caryophyllaceae, Zygophyllaceae, Oxalidaceae, Polygalaceae, Tiliaceae, Aizoaceae, Lythraceae, Combretaceae.	13
Unit III	Vegetative, floral characters and economic importance of the following families: Gamopetalae: Oleaceae, Apocynaceae, Gentianaceae, Boraginaceae, Pedaliaceae, Bignoniaceae, Monochamydeae: Loranthaceae, Nyctaginaceae, Chenopodiaceae, Monocots: Commelinaceae, Aroideae, Cyperaceae.	13
Unit IV	Flora, Monograph, Keys, Botanical gardens – Source of taxonomic information, Anatomy, Embroyology, Palynology, Cytology and Ultra structure and phyto chemistry.	13
Unit V	Biosystematics- its aim and scope – Biosystematic categories – phenotypic plasticity – Turrreson's work – population concept– species and genus concepts – Genecology – ecological differentiation – numerical taxonomy.	13

TEXT BOOKS

1. A classification of flowering plants Vol. I & II Rendle A.R. Cambridge University press.
2. Taxonomy of vascular plants. Lawerance.H.M. Mac Millan & Co.
3. Principles of Numerical Taxonomy. Sokal, S.R and Sneath P.H, N.H Fremen& co.

REFERENCE BOOKS

4. New concepts in flowering plants taxonomy. Heslop. J. Herrison.
5. Plant Taxonomy – Hey wood, V.H. English hand book society
6. Principles and methods of Plant Biosystematics-solbrig. The Mac Millian Company.
7. An introduction to plant Nomenclature. S.S.R. Bennet international Book distribution India.
8. An aid to the International code of Botanical. Hentry A.N. Today & Tomorrow Pvt. Ltd.
9. Principles of angiosperm Taxonomy. Devis& Hey wood Krieger publication Co.
10. Introduction to Principles of Plant Taxonomy Sivarajan Oxford & IBH Pvt. Company.
11. A hand book of field and Herbarium methods Jain S.K. and Rao R.R. Today and Tomorrow Publications.
12. Plant Taxonomy and Biosystematics. Staceclive. A Edward Arnold.

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Dr. P. Sathish kumar	Dr. E. Neelamathi		
Dr. C. Anbarasu			

Department	Botany	
Course	M.Sc., Botany	Effective from the Year: 2016
Subject Code : 16PBY310 Title : BIOCHEMISTRY		Semester:3
Hrs/Week :	5	Credits: 4
Objectives	• To know the biochemical molecules of life • To understand the biophysical laws governing universe	

Unit	Content	Hrs
Unit I	Acids and bases, strength of acids – strong acids, weak acids - inization of water – Kw, pH - dissociation of acids – pKa, Henderson - Hasselbalch equation. Buffers - definition, chemical composition, characteristics of buffer, buffer action, buffer capacity - biological role of buffer system - measurement of pH – colorimetric methods and electrometric methods.	13
Unit II	Carbohydrates: structure and biological functions - monosaccharides: classification, structure - oligosaccharides: structure, formation; common examples – sucrose, lactose - polysaccharides: classification, functions – structure of cellulose, starch and glycogen - sugar derivatives: glycoproteins, proteoglycans, mucoproteins.	13
Unit III	Lipids: classification, properties, functions - structure of fatty acids, essential fatty acids - storage lipids – triglycerols - structural lipids – membrane lipids - lipid biosynthesis, fat breakdown – β oxidation.	13
Unit IV	Amino acids: structure and classification of amino acids - biosynthesis of amino acids - proteins classification of proteins based on structure and function - oligo- and polypeptides - primary structure – peptide bond - secondary structure – Ramachandran plots, α-helix, β sheet - tertiary structure –quaternary structure- functions of proteins	13
Unit V	Enzymes: General characters of enzymes – IUB system of enzyme classification - mechanism of enzyme activity - factors affecting enzyme activity - enzyme kinetics - Michaelis-Menton kinetics - regulation of enzyme activity - allosteric effect - enzyme inhibition – reversible and irreversible inhibition, competitive, non-competitive, uncompetitive - dixon plot - cofactors and coenzymes.	13

TEXT BOOKS

1. Satyanarayana, U. 2005. Biochemistry.Books and Allied (P) Ltd. Calcutta.
2. Lehninger, A.I. 1987. Biochemistry, Kalyani Publishers, New Delhi
3. Veerakumari, I. 2004. Biochemistry, MJP Publishers, Chennai.

REFERENCE BOOKS

4. Campbell, M.K. 1999. Biochemistry, Saunders College Publishing, NewYork.Harborne, J.B. 1999.Plant Biochemistry.Chapman & Hall, New Delhi.Jain, J.L. 2005. Fundamentals of Biochemistry. S. Chand & Co. New Delhi.
5. Plummer, D.T. 1996. An introduction to practical biochemistry.McGraw Hill.
6. Conn E.E. and P.K. Stumpf. 1987. – Outlines of Biochemistry, Wiley Eastern Ltd, Chennai.
7. LubertStryer. 1986. Biochemistry, CBS Publishers, New Delhi.

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Dr. R. Rakkimuthu	Dr. E. Neelamathi		
Dr. P. Sathish Kumar			

Department	Botany	
Course	M.Sc., Botany	Effective from the Year: 2016
Subject Code : 16PBY311 Title : RESEARCH METHODOLOGY		Semester:3
Hrs/Week :	5	Credits: 4
Objectives	• To equip students with the knowledge of scientific data analysis and presentation. • To teach the skills to write research documents • To provide the knowledge on handling softwares in research analysis	

Unit	Content	Hrs
Unit I	**Research:** concept & objectives - types of research: descriptive vs. analytical, applied vs. fundamental, quantitative vs. qualitative, conceptual vs. empirical – research methodology: formulation of research problem – hypothesis development - research process - steps and elements - analysis of the problem – research writing: preparation of research report – presentations - proposals - writing thesis/dissertation and article – LaTeX and manuscript preparation.	13
Unit II	**Literature collection and citation**: Bibliography – bibliometrics (scientometrics): definition - laws (Lotka's Law, Bradford's Law and Zipf's Law) - Bibliometrics indicators and indices – citation index - SCI- h-index – page rank - impact factor and evaluation - citation styles (APA, MLA, Chicago, Vancouver and Harvard) - citations and bibliography using Biblioscape – plagiarism and antiplagiarism softwares (Plagiarism checker, Copyleaks, Viper and Turnitin).	13
Unit III	**Biostatistics**: data collection & representation: graph and tabulation - measures of central tendency: mean (arithmetic), median and mode - measures of dispersion: standard deviation - standard error –co-efficient of variation - measures of significance: Chi-Square test – F-test - t- test – correlation - scatter diagram - Spearman's rank correlation coefficient - regression coefficients - lines of regression & their properties - analysis of variance (ANOVA-single factor) – multivariate analysis – probability of distribution (binomial, poisson and normal).	13
Unit IV	**Softwares for Biostatistics**: MS- EXCEL – spreadsheet – chart sheet – database - data representation (tabulation and graphing) – formulas and statistical functions (mean, median, standard deviation; F-test, t-test,	13

	CORREL and ANOVA) – SPSS – data editor & viewer – data analysis (Chi-square, t-test, correlation, regression and ANOVA (single factor) – graphing.	
Unit V	**Instrumentation:** Microscopy (phase contrast, fluorescent, SEM, SEM and digital) **-** Colorimeter - Spectrophotometer (UV, visible, IR and AAS) – Spectroscopy (FTIR & NMR) - pH Meter – Centrifuges - Lyophilizer - Separation techniques: Chromatography (HPLC and GC-MS) - Electrophoresis (Agarose and PAGE) - ELISA reader – PCR.	**13**

TEXT BOOKS

1. Mount, D. W. 2004. *Bioinformatics*: sequence and genome analysis. *Cold Spring Harbour Laboratory Press.*
2. Kothari, C.R. Research Methodology: Methods and Techniques (2nd revised edition). 2008. *New Age International.*

REFERENCE BOOKS

3. M.H. Cordon and R. Macrae, 1987. Instrumental analysis in the Biological Science, Blackie and Son Limited, London.
4. Sadasivan and Manickam, Biochemical Methods.
5. Jayaraman, J. Laboratory Manual of Biochemistry.
6. Harborne, Phytochemical methods.
7. Prasad and Prasad, Microtechnique.
8. Rajiv, K. Sinha and Shweta Sinha, 2005. Ethnobiology, Surabi Publications, Jaipur.

Journals:

1. *Journal* of Mixed *Methods Research*.
2. *Journal of Research Methods* and Methodological Issues.

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Dr. E. Neelamathi	Dr. E. Neelamathi		
Dr. P. Sathish Kumar			

Department	Botany	
Course	M.Sc., Botany	Effective from the Year: 2016
Subject Code : 16PBY3E2 Title : GENOMICS AND PROTEOMICS		Semester:3
Hrs/Week :	5	Credits: 5
Objectives	• To detail the various web based resources for biological information. • To provide a platform for molecular understanding of the structure-function relations in DNA/RNA/Proteins.	

Unit	Content	Hrs
Unit I	**Bioinformatics:** Introduction to bioinformatics – dogmas of life – central and peripheral - applications – biological databases – NCBI, EBI and Genome net – archieves and information retrieval – gateways to archieves – data warehousing and mining.	13
Unit II	**Genomics:** Genome analysis – prokaryotic and eukaryotic gene structure – c- value paradox – internal organization of structural genes – genome sequencing – clone based sequencing – shot gun method – identification of genes in contigs – CpG islands – ORF – chromosomal rearrangements – Human genome project.	13
Unit III	Sequence alignment – pairwise alignment - methods – scoring matrices – PAM and BLOSUM – multiple sequence alignment – evaluation and applications of multiple sequence alignment – phylogenetic analysis – phylogenetic trees – methods of phylogenetic analysis – distance method – character based method – tree evaluation – tools for phylogenetic analysis.	13
Unit IV	Gene identification and prediction – pattern recognition – gene prediction methods – gene finding by ORF prediction – homology based approaches – statistical and HMM approaches - searching for CG islands and protein binding sites – gene prediction tools.	13
Unit V	**Proteomics:** Structure based protein classification approaches – protein structure databases – protein structure visualization tools - tools for protein structure prediction - primary and secondary structure analysis and prediction – motifs, profiles, patterns and fingerprints search. Proteomics classification - Tools and techniques in proteomics.	13

TEXT BOOKS

1. Rastogi, S. C., N. Mendiratta, and P. Rastogi (2008), Bioinformatics – Methods and applications, Genomics, Proteomics and Drug discovery, PHI Learning pvt Ltd.,New Delhi.
2. Baxevanis and Quellette (1998). Bioinformatics. A practical guide to analysis of genes and proteins.
3. Arthur M.Lesk (2002) Introduction to Bioinformatics.

REFERENCE BOOKS

4. Bioinformatics: A biologist's guide to biocomputing and the internet. 2000. Stuart M. Brown.
5. Introduction to Bioinformatics. 1999. T.K.Attwood and Parry-Smith.
6. Introduction to Bioinformatics. 2002. S.Sundararajan and R.Balaji.
7. Bioinformatics: Sequence and genome analysis. 2001. David W. Mount. SEM.IV

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Dr. E. Neelamathi	Dr. E. Neelamathi		

Department	Botany	
Course	M.Sc., Botany	Effective from the Year: 2016
Subject Code : 16PBY312 Title : CORE PRACTICAL-III		Semester:3
Hrs/Week :	5	Credits: 4
Objectives	• To know the vegetative and floral characters of angiosperms. • To understand the techniques of herbarium • To get hands on experience with bioinformatics tools	

Unit	Content	Hrs
Unit I	**PLANT SYSTEMATICS** • Study of the vegetative, floral characters & economic importance of all the families given in the theory • Preparation of artificial key • Submission of herbarium sheets – 30.	13
Unit II	**BIOINFORMATICS** • An introduction to the computing platforms. • Molecular databases. • Database searches (BLAST and FASTA). • Prediction of ORF, splice sites & promoter elements of DNA. Gene finding strategies in genomic DNA. • Estimating protein secondary structure and physical attributes. • Multiple sequence alignment. • Secondary structure of proteins. • Molecular modeling and visualization. • Getting familiar with SPSS. • Calculating the measures of central tendency, dispersion. • Hypothesis Testing. • Comparing Means using SPSS. • Correlation & regression analysis using SPSS.	13

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Dr. E. Neelamathi	Dr. E. Neelamathi		
Dr. P. Sathish Kumar			
Dr. C. Anbarasu			

Department	Botany	
Course	M.Sc., Botany	Effective from the Year: 2016
Subject Code : 16PBY313 Title : CORE PRACTICAL-IV		Semester: 3
Hrs/Week :	5	Credits: 4
Objectives	• To understand the techniques of biomolecular estimation • To know the qualitative tests for bioactive compounds • To get a knowledge on OFFICE tools to solve statistical problems.	

Unit	Content	Hrs
Unit I	**BIOCHEMISTRY:** 1. Estimation of starch by Anthrone method. 2. Estimation of protein Lowry's method. 3. Estimation of lipid. 4. Estimation of amino acids. 5. Determination of enzyme activities – Catalase, Ascorbic acid oxidase and polyphenol oxidase. 6. Qualitative estimation of phenols, flavonoids and alkaloids.	13
Unit II	**RESEARCH METHODOLOGY** 1. Research process 2. Hypothesis development 3. Research writing 3.1. How to write a research proposal? 3.2. How to write a research report? 3.3. Thesis writing 3.4. Manuscript preparation using latex 4. Bibliometrics 5. Bibliometrics index 6. Citation index 7. Citation styles 8. Bibliography and biblioscape	
UnitIII	**BIOSTATISTICS** 1. Collection, analysis and graphical representation of data 2. Measures of central tendency - mean, median and mode 3. Measures of dispersion: range, standard deviation, coefficient of variation correlation 4. Test of significance - Chi-square test and Student't' test. 5. Simple exercises in MS- Word 6. Presentation in MS-Powerpoint 7. Statistical calculations and chart preparation in MS-Excel 8. Creation of database in MS-Access.	13

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Dr. R. Rakkimuthu	Dr. E. Neelamathi		
Dr. C. Anbarasu			

Department	Botany	
Course	M.Sc., Botany	Effective from the Year: 2016
Subject Code : 16PBY414 Title : PLANT BIOTECHNOLOGY		Semester:4
Hrs/Week :	5	Credits: 4
Objectives	• To acquire knowledge on plant tissue culture • To provide detailed information about the tissue culture practices • To cover information about the biotechnology to agriculture, in raising transgenic plants	

Unit	Content	Hrs
Unit I	Genome organization and protein targeting: general organization of nuclear, mitochondrial and chloroplast gene - targeting of proteins synthesized in cytoplasm to chloroplast, mitochondria of plants – *Arabidopsis* – genome size and organization.	13
Unit II	Structure and expression of gene: tissue specific genes - structure and organization of nuclear genes concerning storage proteins, phytochrome, microbial infection and other stresses - maize transposable elements - organization and function of transposons.	13
Unit III	Development of plant transformation cassettes: Structure and function of Ti plasmid of *Agrobacterium* - mechanism of T-DNA transfer to plants - Ti plasmid vectors for plant transformation - promoter and marker genes in plant transformation.	13
Unit IV	Gene transfer and tissue culture techniques: physical, chemical and biological methods for plant gene transfer – micropropagation - shoot-tip culture - callus and cell suspension culture - haploid production - rapid clonal propagation - somoclonal variation - somatic embryogenesis - somatic hybridization - cybrids - synthetic or artificial seeds.	13
Unit V	Transgenic plants for virus resistance - herbicide tolerance - delay of fruit ripening - resistance to insect, fungi and bacteria - production of antibodies, viral antigens and peptide hormones in plants – RNAi mediated crop improvement – ethics in plant biotechnology – IPR.	13

TEXT BOOKS

1. Slater A. Scott N. and Fowler M. 2008. Plant Biotechnology: The Genetic Manipulation of Plants. Oxford University Press Inc.
2. Satyanarayanan U. 2007.Biotechnology.Books and Allied (P) Ltd., Kolkata.

REFERENCE BOOKS

3. Lea, PJ, Leegood, RC . 1993. Plant Biochemistry and Molecular Biology. eds. John Wiley and Sons, Chichester and New York.
4. Mahesh S. 2008 Plant Molecular Biotechnology. New Age International Publishers.
5. Ramavat K.G. 2006 Plant Biotechnology S. Chand and Co. Ltd., New Delhi
6. Trivedi P.C. 2000 Plant Biotechnology – Recent Advances. Panima Publication Corporation,New Delhi
7. Ignacimuthu S. 1998 Plant Biotechnology. Oxford and IBH
8. Reynolds P.H.S 1999. Inducible Gene Expression in Plants.CABI Publishing, U.K.

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Dr. E. Neelamathi	Dr. E. Neelamathi		
Dr. R. Rakkimuthu			

Department	Botany	
Course	M.Sc., Botany	Effective from the Year: 2016
Subject Code : 16PBY415 Title : ENVIRONMENTAL MANAGEMENT AND CONSERVATION OF BIODIVERSITY		Semester: 4
Hrs/Week :	5	Credits: 4
Objectives	• To exposes the students to the concept of ecology, environmental problems and their consequences. • To give an insight to the students as how to exploit various biotechnological strategies to solve these environmental hazards, with special attention on the byproducts of different industries.	

Unit	Content	Hrs
Unit I	Current status of environment – issues and challenges - climate change - greenhouse gases: sources, trends and role - ozone layer and ozone hole - consequences of climate change (CO_2 sequestration, global warming, sea level rise, UV radiation) - El-Nino and La Nina phenomenon - environmental monitoring: meaning and scope - concept of biomonitoring and biological indicator	13
Unit II	Environmental management: definition and basic concepts - environmental impact assessment (EIA) : Scope, importance and application of EIA process - eco-restoration/remediation - ecological foot prints – carbon foot print - ecolabeling - environmental auditing & standards - certification& accreditation- SO standards for environmental management systems (EMS) - ISO 14000 14001 & 26001 - OHSAS 18001.	13
Unit III	Environmental agencies: EPA - MAB - UNEP - MoEn&F - treaties, agreements and conventions: Geneva convention (1979) Vienna convention (1985) - convention on biological diversity (CBT) - Convention on International Trade in Endangered Species of Fauna and Flora (CITES, 1973) Montreal protocol (1987) - Earth summit 1992 & 2002 - Convention on biodiversity (1992) – United Nations Framework Convention on Climate Change (UNFCCC) - Kyoto protocol (1997) – Antarctic treaty (2004).	13
Unit IV	Biodiversity: Biodiversity concepts and definitions - genetic diversity, species diversity and ecosystem diversity - agro biodiversity and cultivated	

	taxa - loss of biodiversity - threats to biodiversity: natural and anthropogenic - IUCN threat categories: red data book and red lists - conservation of biodiversity: *in situ* conservation – sanctuaries, national parks, biosphere reserves, MPCA, MPDA, mangroves, coral reefs, sacred groves - *ex-situ* conservation: botanical gardens. arborata and palmate - herbaria, gene banks, seed banks.	**13**
Unit V	National and international organizations in conservation of biodiversity – IUCN, NBPGR, BSI, ICAR, CSIR, DBT, DST, NBSAP, NGOs - biodiversity legislation and conventions - international biodiversity laws - biodiversity register - national biodiversity legislation – national biodiversity bill (2000) –biological diversity act (2002) - trade restrictions - economic, legal and ethical issues of biodiversity - Indian case studies on conservation/management strategy (project tiger & project elephant).	**13**

Text books

1. Krishnamurthy, K.V. 2004. An advanced textbook on Biodiversity: Principles and practice.
2. Oxford and IBH. Publ. Co. New Delhi. 260p.
3. Singh, J.S., Singh, S.P. & Gupta, S.R. 2006. Ecology, Environment and Resource Conservation. Anamaya Publ., New Delhi. 688Pp.
4. Cunningham, P. and Mary Ann Cunningham, 2007. Principles of Environmental Science.The McGraw-Hill, New Delhi.

Reference Books:

1. Chiras, D. D., 2009. Environmental Science, 8th edition, Jones and Bartlett Publishers, Sudbury, Massachusetts (www.jbpub.com).
2. Groombridge, B. (Ed.) 1994. Global Biodiversity – status of the Earth's livng
3. resources. Chapman & Hall, London.
4. Melchias,G.2001. Biodiversity and Conservation. Oxford IBH. New Delhi. 236Pp.
5. Odum E.P. Gray, W. Barrelt 2004.Fundamentals of Ecology.15th edition. Thomas Asia Pvt. Ltd.
6. Chapman, J.L. and Reiss, M.J. 1999. Ecology; Principles and Applications.II Ed. Cambridge University Press. New York.
7. Putman, R.J. and S.D. Wratten. 1984. Principles of Ecology. University of California Press, Berkeley and Los Angels.
8. Sharma PD. 2001. Ecology and Environment. Rastogi Publications, Meerut.
9. Burden F. R., McKelvie I., Forstner U., and Guenther A., 2002, Environmental Monitoring Handbook, McGRaw-Hill, New York.
10. Goldsmith F. B., 1995, Monitoring for Conservation and Ecology. London: Chapman and Hall.

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Dr.R.Rakkimuthu	Dr. E. Neelamathi		
Dr. P.Sathish Kumar			

Department	Botany	
Course	M.Sc., Botany	Effective from the Year: 2016
Subject Code : 16PBY4E3 Title : FOREST BOTANY		Semester: 4
Hrs/Week :	5	Credits: 5
Objectives	• To study the forest ecosystem and associated components • To study the parameters to measure the forest cover • To import knowledge on conservation measures for forest	

Unit	Content	Hrs
Unit I	Forest – introduction - definition – classification - forest types and their components: montane forests (evergreen, coniferous, sholas and grasslands); terrestrial forests (semi evergreen, deciduous, moist deciduous, dry deciduous and scrubs jungles); tidal forests (salt marsh and mangroves).	13
Unit II	Dendrology: introduction - importance and scope of dendrology - general forms of woody trunk and deviations (buttresses, flutes, crooks) - morphology and description of barks of common trees - characteristics of blaze on bark, colour, gums, and latex - morphology of leaf, description of different types of leaves, - colour of young and old leaves as features of identification - reproductive morphology of plants - description and identification of reproductive parts.	13
Unit III	Forest mensuration - introduction – definition - objectives and scope of forest mensuration. Scales of measurement (nominal, ordinal, interval and ratio scale) - measurement of single tree – standard rules - measurement of tree diameter and girth using rulers, callipers and tapes - bark measurements - objectives, thickness, surface area and volume - crown measurements - objectives, diameter, height, surface area and volume - height measurements – (direct and indirect methods) - height measuring	13

	instruments - Abney's level.	
Unit IV	Wood science: Microscopic structure of wood: vessels, tyloses, tracheids, fibres, wood parenchyma - wood rays, grain and texture - chemical composition of wood - Physical properties of wood (Colour luster, fluorescence, odour and weight) - mechanical properties of wood – (bending, hardness and shear) - annual rings – identification and classification of wood (early wood and late wood, soft wood and hard wood, pycnoxylic and manoxylic wood) - annual rings - dendrochronology - commercial wood species and identification – synthetic woods – plywood – fuel wood – pulp and paper making woods – match stick wood.	**13**
Unit V	Forest – conservation and management**:** Strategies for conservation - *In situ* conservation: (afforestation, social forestry, agro forestry, botanical gardens, biosphere reserves, national parks, sanctuaries, sacred groves and sthalavrikshas) - *ex situ* conservation (cryopreservation, gene banks, seed banks, pollen banks, DNA banks, tissue culture and biotechnological strategies) - silviculture – elements and systems - clear felling, simple coppice and selection felling.- ethnobotany - forest conservation through laws - the biological diversity Act (2002 in force) - world conservation strategy (WCS) and National biodiversity strategy and action plan (NBSAP)..	**13**

TEXT BOOKS

1. Daniel, Helms and Baker, 1979. Principles of Silviculture McGraw-Hill Book 1. Company.

2. Chaturvedi, A.N. and L.S. Kanna. 1982. A handbook on Forest Mensuration. International Book Distributors.

3. Avery, T.E. 1967. Forest Measurements. Mc Grand Hill Book Company, Newyork.

4. Ramprakash. (1986). Forest management. IBD Publishers, Debra Dun.

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Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
Dr. P.Sathish Kumar	Dr. E. Neelamathi		
Dr. C. Anbarasu			

Department	Botany	
Course	M.Sc., Botany	Effective from the Year: 2016
Subject Code : 16PBY416 Title : CORE PRACTICAL-V		Semester:4
Hrs/Week :	5	Credits: 4
Objectives	• To understand the concepts of plant tissue culture techniques • To study the vegetation and analyse its properties • To acquire knowledge on forest and its nature.	

Unit	Content	Hrs
Unit I	**PLANT BIOTECHNOLOGY:** 1. Isolation of genomic DNA from plants 2. Qualitative and quantitative analysis of plant genomic DNA 3. Protein separation by SDS-PAGE 4. Preparation of Plant Tissue Culture Media 5. *In vitro* germination of seeds.	13
Unit II	6. Callus induction 7. Meristem culture 8. Micropropagation 9. Production of artificial seeds 10. Preparation of competent cell- *E. coli* and *Agrobacterium* 11. Agrobacterium-mediated gene transformation to plants. 12. Amplification of a plant gene using PCR	
Unit III	**Environmental management and Conservation of biodiversity** 1. Vegetation analysis- Quadrate method and Belt transect methods. 2. Estimation of total biomass and herbage yield by harvest method. 3. Water analysis for dissolved oxygen and carbon-di-oxide.	13

	4. Calculation of pollution indices 4.1 Bio-accumulation 5. Environmental impact Assessment 6. Carbon foot printing 7. Biodiversity indices 8. Ex-situ conservation 9. Case studies – Environmental Management	
Unit IV	**FOREST BOTANY:** 1. Determination of age of tree 2. Phenology studies 3. Germination studies – percentage, competition. 4. Physical features of wood – height, diameter, density, moisture.	**13**
Unit V	5. Anatomical features of wood – porous, non-porous, ring-porous, diffused-porous, different kinds of wood parenchyma rays. 6. Menstruation – measurement of tree height and diameter 7. Species diversity index – (Shannon wiener index, Simpson diversity index) 8. Mapping studies 8.1 Forest types (Evergreen, Semi evergreen, Deciduous and Mangrove)	**13**

Compiled by **Name with Signature**	**Verified by HOD Name** **with Signature**	**CDC**	**COE**
Dr. P. Sathish Kumar	Dr. E. Neelamathi		
Dr. C. Anbarasu			

Department	Botany	
Course	M.Sc., Botany	Effective from the Year: 2016
Subject Code : 16PBY4P1 Title : PROJECT WORK AND VIVA VOCE		Semester: 4
Hrs/Week :	6	Credits: 8
Objective :	• To get knowledge on research • To improve knowledge on instrumentation • To provide the knowledge on handling software in research analysis	

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
Dr. E. Neelamathi	Dr. E. Neelamathi		